Ecosystem Disruption and Human Health

A Joint IDRC/UNEP Consultation
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Human beings and the natural world are on a collision course. Human activities inflict harsh and often irreversible damage on the environment and on critical resources. If not checked, many of our current practices [will] put at serious risk the future that we wish for human society and the plant and animal kingdoms, and may so alter the living world that it will be unable to sustain life in the manner that we know. Fundamental changes are urgent if we are to avoid the collision our present course will bring about. — *Dr. David Suzuki, Plenary Speaker referring to the World Scientists' Warning to Humanity, a warning signed by more than 1600 senior scientists including over half of all Nobel Prize winners.*

Canada's International Development Research Centre (IDRC) and the United Nations Environment Programme (UNEP) are working together to improve human health through better stewardship and management of the earth's ecosystems and our natural resources.

As part of this effort, IDRC and UNEP co-hosted a consultation in Hull, Canada, in November 1999. This meeting brought together participants from academic institutions, non-governmental organizations, international institutions and national governments to explore the Ecosystem Approaches to Human Health concept and the application of this concept in agricultural, urban and coastal environments.

Understanding An Ecosystem Approach to Human Health

can be described as an ensemble of air, soil, water and living organisms (including human beings) and the interactions among each of these elements (definition adapted from the International Joint Commission for the Great Lakes, 1988). Any human activity which disrupts the ecosystem threatens a delicate balance upon which our health and well being and indeed our lives and that of future generations may depend. More than ever before, human kind holds the capacity to disrupt that balance.

In a sense, an ecosystem approach to human health is simple. It follows the connection between people's activities and their impact on the environment, and between the state of the ecosystems and people's health.

In another sense, an ecosystem approach to human health is complex. It draws on science and technology as well as traditional knowledge to grasp a web of causes and effects linking ecosystems and human health.

An Ecosystem Approach to Human Health Requires:

- acknowledgement of the complex and often unpredictable relationships between the living and non-living components of our ecosystems;
- transdisciplinarity among diverse academic and applied professions;
- an emphasis upon the local community's understanding and knowledge of health and ecosystem management;
- an understanding of the differing roles of women and men in achieving and preserving health; and
- a promotion of a holistic view of human health and environmental sustainability.

A Summary of the Consultation Proceedings

Challenges of an Ecosystem Approach to Human Health

The ecosystem approach to human health presents many challenges as it cuts across traditional research boundaries. Participants at the IDRC/UNEP consultation held working group sessions which focussed on these challenges. A brief synthesis of the challenges identified and discussed follows:

Finding a Shared Vision

An ecosystem approach requires input from a variety of individuals and institutions. Research teams will be quite large and diverse. The teams need to build a consensus regarding a definition of the health problem and an understanding of how the ecosystem influences health. The challenge lies in finding methodologies that support communication and equal partnerships, among disciplines and across all levels of society.

Assuring Community Access

Communities possess important information and perceptions about their health and their ecosystems. Communities must play a central role in setting development and research priorities. The challenge is to ensure that community members are able to participate regardless of age, sex, ethnicity or other socio-economic distinctions. Another part of the challenge lies in the opportunity which exists for the community and other researchers to access and exchange new knowledge through their relationships. Research objectives and development activities must be continuously realigned in light of this new knowledge.

Gaining Credibility

Gaining support and funding for research into non-traditional interventions can be a difficult task, such as obtaining funding for a department of agriculture instead of the department of health when the research issue might be malaria. The challenge is to establish credibility in the research and the donor community by producing carefully documented projects that convincingly illustrate the concept and the strengths of the ecosystem approach to human health.

Measuring Success

New indicators may be needed to characterize unique and complex systems or to allow health or ecosystem status to be measured by community members. The challenge lies in creating the unique indicators that may be required to suit the specific context of each project.

News from the Conference

Scholarship Launched: Université du Québec à Montréal – Donna Mergler, a professor in the Department of Biological Sciences, was named as the first recipient of an IDRC three-year academic scholarship to promote research and teaching in the emerging field of Ecosystem Approaches to Human Health Studies.

Competition Winners: The following projects and research institutions received IDRC funding through the 1999 Ecosystem Approaches to Human Health Competition:

- *Canada, Uganda, Kenya* – For strategies to control sleeping sickness, which affects both humans and their livestock (International Livestock Research Institute, Kenya, Ugandan Livestock Health Research Institute, and the University of Guelph, Canada).

- *Canada, Thailand* – For research into changes in traditional cropping practices and the impact of these changes on nutrition in families in the mountains of northern Thailand (International Centre for Research in Agroforestry, Thailand, Changmai University, Thailand and the University of British Columbia, Canada).

- *Canada, Sri Lanka* – For a project on the impact of changes in water management and their effect on the impoverished populations in intensified agricultural areas in Sri Lanka (International Water Management Institute, Sri Lanka, The Mahawali Authority, Sri Lanka, and McGill University, Canada).

Health Projects using an Ecosystem Approach

Researchers involved in projects from around the world brought their expertise and views to the IDRC/UNEP consultation. Some of these projects are:

Involving The Community: A Participatory Approach

Community residents often have the best understanding of local health conditions and the surrounding ecosystems. They can provide important insights into related issues and their solutions.

A successful ecosystem approach includes individuals from the community in the research team and ensures their active participation. An ecosystem approach requires that communities have the power to apply their knowledge to research and action plans and the ability to gain access to new knowledge on ecosystem relationships and human health.

Managing Resources in the East African Highlands

In the Ethiopian highlands, malnutrition and micronutrient deficiencies threaten a generation of children. Poverty is widespread, and land degradation limits the production of teff and wheat — the primary crops. Health and agricultural researchers from the Ethiopian Agricultural Research Organization, the Ethiopian Institute of Health and Nutrition and the International Livestock Research Institute used an ecosystem approach to find simultaneous solutions to the problems of human health and nutrition, soil degradation and lack of cash income.

Researchers discovered that the use of chemical fertilizers resulted in only small increases in

food production, but caused significant soil and nutrient loss for the farm land. The research team combined a range of interventions — improved forestry practices, new crop varieties, manure and chemical fertilizers, community-managed drainage and more secure land tenure. When managed as an ecosystem, researchers found that the land could meet the local people's minimum daily food requirements, produce a tenfold increase in cash income and decrease soil loss by 20 percent.

Addressing Poverty in Peru

Despite the rich resource base in the Ucaylai River basin of Peru, poverty traps many people. Many of them suffer from serious illnesses, including malnutrition, anemia, vitamin A deficiency, persistent diarrhea, malaria and dengue fever. Researchers from the University of Guelph, the University of Waterloo and the International Centre for Tropical Agriculture in Colombia collaborated to examine the social and environmental factors that were affecting residents' health. The researchers found that people often lack access to health care because clinics are located far away in urban areas, and seasonal flooding increases this isolation. Thus people must rely on themselves for their food, for hygiene, and for knowledge of how to treat tropical diseases and other health problems with wild and domesticated medicinal plants.

Other factors contribute to their poverty and poor health. For example, new roads make it possible to harvest more timber, but profits flow outside the district. Land that could be used for food production is devoted to growing illegal coca crops used in the production of cocaine. Also, a genetic tendency to have childhood milk allergies undermines programs to reinforce the children's diets with milk products.

By developing a more holistic understanding of this complex Amazonian ecosystem, the researchers and community are aiming to identify multiple interventions that will help improve local people's health.

Understanding the Roles of Men and Women: A Gender Integrative Approach

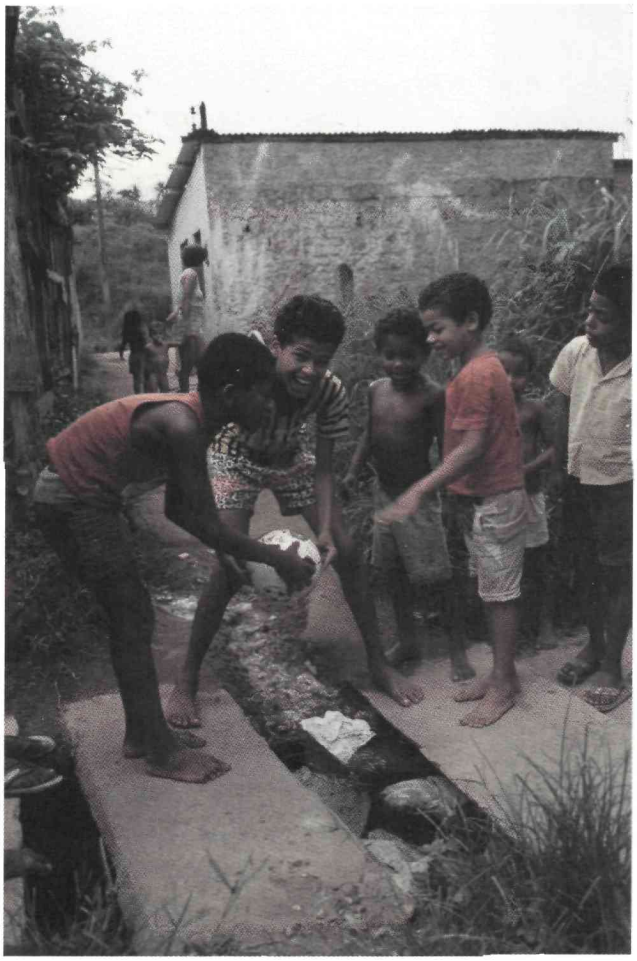
In the environment, differing access to and control over natural resources by men and women becomes more relevant as resources deteriorate or disappear. In the field of environment and health, women often suffer different effects from men when exposed to environmental health risks. In the field of health, women play different roles from men in most communities as health care providers.

Understanding these differing roles and positions in society can be important in analysing the impact of human activities on ecological systems. Understanding role differences can lead to more successful resource management, and to greater assurance that health issues are addressed and interventions are beneficial and equitable.

Controlling Malaria in Oaxaca, Mexico

Malaria remains one of Mexico's main public health concerns. An estimated one-third of the population is at risk of infection. In 1998, the state of Oaxaca reported 13,000 cases of malaria, 80 percent of all cases in Mexico. The phasing out of DDT, a chemical used to kill mosquitoes which carry malaria, is bringing new urgency to the search for malaria controls.

Cutting across traditional research boundaries, public health researchers, anthropologists, and malaria and environmental specialists are working with community members to find



solutions. They are exploring ecological and social strategies to assist in the diagnosis, treatment, surveillance and prevention of malaria. Research results will provide new insight into malaria control, with a focus on affordable alternative methods and community participation — approaches that can also be used in many other countries.

Growing Rice in West Africa

Rice is becoming an important crop in West Africa, where many women grow the crop to supplement their family's food supply and income. In 1994, the West Africa Rice Development Association set out to assess the health risks in three distinct rice growing ecosystems in Mali and Côte d'Ivoire. Originally, it was believed that irrigation schemes and wetland management practices might be increasing the transmission of malaria.

Research results were surprising. In the dry region of Sahel, the team found that irrigation does not increase malaria transmission, and could actually reduce its prevalence. Similarly, the rice-growing practices in the wet lands of the savanna — including production of two crops per year — does not increase malaria transmission. Instead, rice cultivation in the savanna was found to benefit the community by providing food and by increasing women's disposable incomes. This additional income makes it possible for community members to seek health treatments. Researchers did find, however, that other non-malarial fever episodes could be linked to local agricultural practices. For more information, see www.cgiar.org/warda/research/health/index.htm.

Protecting Urban Health in Kathmandu, Nepal

Kathmandu is one of the fastest growing cities in one of the poorest countries in South Asia. As in many other cities in developing nations, rapid urban growth has led to the contamination of air, land and water. The general deterioration of the urban environment is impairing the health and well-being of its city dwellers.

Researchers and community members in two of the poorest wards of Kathmandu are working together to identify the key factors that will reduce environmental degradation and improve people's health. Water pollution, poor sanitation, improper garbage collection and disposal, unsuitable operation of slaughterhouses, and unhygienic practices in restaurants and meat stores are some of the priority issues that are being identified by community members. The team will work together to implement changes and evaluate resulting environmental and health improvements.

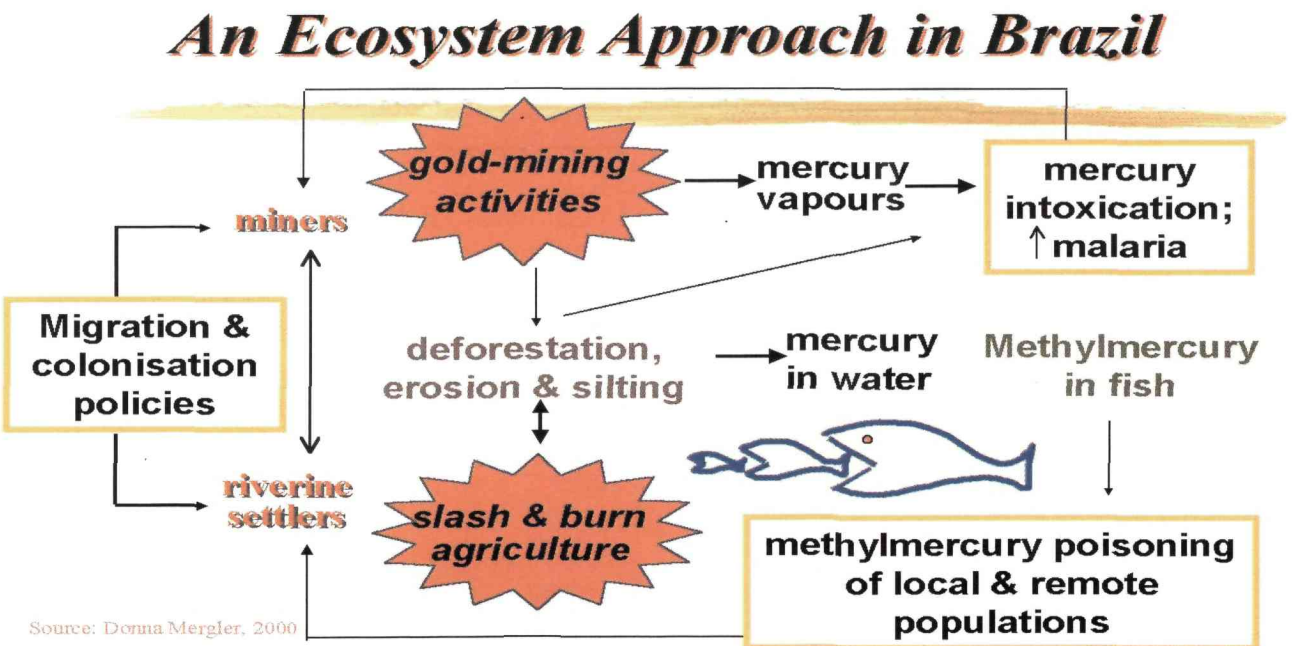
Crossing Academic Lines: A Transdisciplinary Approach

Starting in 1994, a transdisciplinary team of IDRC-sponsored researchers investigated the link between gold mining and high levels of mercury found in fish in the Amazon region. The team included a medical doctor, engineer, nurse, tropical forester, neurotoxicologist, biochemist, sociologist, community agent, fisherman and community leader, as well as environmental advocates.

Surprisingly, the team found that gold mining contributed little to overall mercury contamination. Instead, the cutting and burning of trees along the river banks coupled with the area's climate were creating favourable conditions for the methylation of mercury and its transfer to the food chain. Even at low levels, mercury was causing impairment of motor and visual abilities of people dependent on fish in their diet.

The research team collaborated with community members to identify areas of the river with high levels of methylmercury. They also suggested other foods as an alternative to a diet of high-risk varieties of fish. Now, the researchers are exploring new soil and crop management techniques that can reduce the transfer of mercury into aquatic ecosystems. They are monitoring the local people's health to determine if better management and use of the natural resources can contribute to health improvements.

This transdisciplinary research generated a greatly enhanced understanding of the behaviour of a complex ecosystem. Such an understanding could not have developed had the researchers worked independently. Transdisciplinarity is essential to a full understanding of the determinants of health in complex ecosystems.



Tropical Disease and an Ecosystem Approach to Human Health

Over 70 researchers, representing countries in Latin America, North America and Africa, met in Rio de Janiero, Brazil, in November 1999 to discuss the implications of using an ecosystem approach to understand and prevent communicable diseases.

The meeting took place amid concern that increases in the occurrence of tropical diseases — such as malaria, dengue fever, chagas and leishmaniasis — are linked to disruption of agricultural and urban ecosystems. Participants called for stronger institutional links to develop and implement an ecosystem approach to human health.

The conference was jointly sponsored by IDRC, UNEP, Oswaldo Cruz Foundation, and the Pan American Health Organization.

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What is IDRC?

The International Development Research Centre (IDRC) works with researchers to help find practical long-term solutions to social, economic and environmental problems in developing countries. In particular, support is directed towards developing the indigenous research capacity necessary to sustain policies and technologies that can build healthier, more equitable and more prosperous societies.

IDRC was established in 1970 by an Act of the Parliament of Canada.

For further information on conference proceedings and publications, as well as on IDRC's ECOHEALTH Program Initiative, please contact:

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UNEP

What is UNEP?

The mission of the United Nations Environment Programme (UNEP) is "to provide leadership and encourage partnerships in caring for the environment by inspiring, informing and enabling nations and people to improve their quality of life without compromising that of future generations."

UNEP was established in 1972, after the Stockholm Conference on the Human Environment, as the environmental conscience of the United Nations system.

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